## REMARKS

The present invention is a method for constructing a reservoir model representative of an underground reservoir, including discretizing said reservoir by a set of grid cells, and associating with said reservoir model a permeability field constrained by *a priori* geologic data and production data or pressure data obtained from well tests collected in said reservoir. The method constructs an initial reservoir model including generating a permeability field in accordance with stochastic model coherent with the *a priori* geologic data; identifies zones inside said reservoir; calculates permeabilities of said zones and carries out, by means of a simulator, a simulation of fluid flows, to estimate corrections to be applied to said permeabilities in order to reduce a difference between said production data or pressure data obtained and said simulated production or simulated pressure data; propagates said corrections to said set of grid cells to said reservoir model, by means of an iterative optimization process comprising minimizing a function which depends on said corrections, using a technique of gradual deformation of utilizations of said stochastic model; and using said reservoir model including said corrections propagated to said set of grid cells to develop said underground reservoir.

The method is disclosed as being useful for the development of reservoirs by constructing the reservoir model and using the model to develop the underground reservoir. See the original Abstract of the Disclosure which, in the last sentence, makes reference to "—Applications: notably oil reservoirs development for example". The specification has been amended at the end to recite "The invention has application notably in the development of oil reservoirs."

Section 8 of the Office Action, under the heading "Claim Interpretation", is considered to be non-pertinent to the examination of this case. The Examiner cannot cite any authority for considering steps such as "allowing" or "enabling" as not being limiting and further, "any prior art not explicitly prohibiting the performance of the function inherent anticipates the limitation". In any event, since the claims do not recite allowing or enabling steps *per se*, it is submitted that such statements are irrelevant to the examination of this application.

Section 9 of the Office Action, under the heading "Claim Objections", indicates that claims 31 and 32 are substantial duplicates. The dependency of claim 32 has been amended to depend from claim 27 to eliminate the substantial duplication.

The dependent claims have been amended to recite "The method..." as requested by the Examiner.

Claims 27-42 stand rejected under 35 U.S.C. §101 as being directed to non-statutory subject matter. Specifically, the Examiner reasons as follows:

> The method claims do not produce a useful, tangible, and concrete final result. The steps of the method claims do not produce a useful, tangible, and concrete result. They merely recite a software algorithm, per se, which, for example, does not display, store, or otherwise provide a useful tangible output. Note exemplary claim 27 which only recites software steps and does not produce a useful tangible and concrete final result. See MPEP 2106 [R-5] (partially recited above). The last limitation recites intended use of "using said reservoir model [...J to develop said underground reservoir". This limitation is not given patentable weight as it is merely intended use without actual steps of how that model is being used in the development of the reservoir.

The grounds of rejection are traversed for the following reasons.

With respect to claim 27, it is submitted that "using said reservoir model, including said correction propagated to said set of grid cells, to develop said

underground reservoir" is a "useful, tangible and concrete result." The Examiner is in effect suggesting that there is no utility to using reservoir models to develop an underground reservoir when, in fact, it is extremely well known in the art that reservoir models are an important tool in the development of production from underground reservoirs.

The following references demonstrate the well-known nature of reservoir models and their important utility which are United States Patent 5,992,519, the publication "Oil & Gas Science and Technology" – Rev. IFP, Vol. 57 (2002), No. 3, pp. 251-258, and an article from PetroMin. Aug. 2003. These documents are discussed as follows with copies being attached hereto.

The Abstract of United States Patent 5,992,519 is reproduced below with underscoring demonstrating the use of reservoir models in order to determine a production strategy.

Abstract:

> The method for the active or automated control of the reservoir sues a reservoir model with available data such as seismic, log, and core data as inputs and uses the reservoir model in conjunction with a reservoir simulation tool in order to determine a production strategy which will maximize certain criteria, e.g., profits._The production strategy may include fixed elements which are not easily altered once the wells go into production, and variable elements which can be adjusted without serious effort during production. The production strategy is implemented by drilling wells, etc., and fluids are then controllably produced from the reservoir according to the variable production strategy; i.e., fluid flow rates are monitored by sensors, and, by adjusting control valves, are kept to desired values (which may change over time) set according to the variable production strategy. According to another aspect of the invention, information gleaned as a result of the adjustments to the control means is used to update the reservoir model. As a result, the variable and fixed production strategies can be updated and implemented.

The Abstract from the Oil & Gas Science and Technology publication is reproduced below with underscoring.

> Abstract
> Integrated reservoir management is an attractive process to add value to the oil companies' assets. Indeed, increasing the reserves of their reservoirs already in production through an improved development strategy constitutes for the oil companies a real opportunity and an economic alternative to costly and risky exploration surveys. Integrated reservoir management is basically a way of combining complementary approaches and techniques such as reservoir characterization, use of complex well architecture, special core analysis design of recovery processes, reservoir monitoring and reservoir simulation, and creating a positive synergy between them. Thanks to the advances that have been observed in the domain of the computer science, reservoir management means also real time management. Thus, the large amount of data acquired can be while producing a reservoir used to develop the knowledge of the reservoir, update the reservoir model, reduce the underlying uncertainties, design the most suitable production architecture, ensure the productivity and the injectivity of the wells, target bypassed zones, select the most appropriate recovery process, and hence, increase the overall recovery. Most of the ingredients of such a strategy are already available. What still needs to be developed is a productive way of linking those ingredients together to build an integrated system. Such a system, when made available will constitute a major toolkit in the toolbox of the production engineers. In this paper, we review and illustrate the different ingredients that have to be included in such an integrated system.

The importance of integrated reservoir management of reservoirs already in production is discussed involving an improved development strategy with integrated management being described as involving "reservoir characterization" which is known to involve reservoir models.

Finally, the PetroMin. August 2003 publication, in the summary, in the third column, on page 70, states:

> "Landmarks' PowerModel, the first application to be built in the new DivisionSpace family, revolutionizes reservoir-modelling work flows. PowerModel rapidly creates simulator-ready reservoir models allowing asset teams to make better reservoir management decisions in much shorter times."

It is therefore seen that the subject matter of claim 27, namely, a reservoir model used to develop a reservoir has a high degree of utility and is, in fact, part of the well-known process of using a reservoir model to manage petroleum assets. Accordingly, it is submitted that the Examiner's conclusion that there is no useful, tangible and concrete final result of using a reservoir model to develop a reservoir is erroneous. The final result is, in fact, a constructed model produced by the claimed series of steps which has a high degree of utility demonstrated by the aforementioned sources of information cited above which is used to develop the reservoir.

Additionally, it is noted that the Examiner states: "[t]he last limitation recites intended use of "using said reservoir model[...]to develop said underground reservoir" with the Examiner concluding that it is given no patentable weight as it is merely intended use without steps of how that model is being used in the development of the reservoir. This reasoning is erroneous for the following reasons.

As demonstrated by the aforementioned prior art sources cited above, those of ordinary skill in the art very well understand the importance of how to use reservoir models. It is not necessary to tell a person of ordinary skill in the art how to use a reservoir model since they are recognized in the field to be important tools in the production of actual petroleum assets. Accordingly, there is no requirement that Applicants recite in claim 27 a series of steps beyond those which are already recited therein. The Examiner is confusing statutory subject matter with claim breadth which Applicants regard as their invention. Accordingly, it is submitted that claim 27 and claims dependent therefrom are statutory subject matter.

Claims 27-42 stand rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the enablement requirement. As has been stated above, the citation of prior art demonstrating the well-known usage of reservoir models in the development of oil reservoirs makes it unnecessary for Applicant to describe in detail how an oil reservoir is developed from an oil reservoir model since such subject matter is extremely well known. The Examiner's conclusion that it would require undue experimentation to develop an oil reservoir using a model is belied by the fact that numerous references are made in the prior art, demonstrating that reservoir models are highly useful for developing of petroleum resources and do not require undue experimentation to be used. Accordingly, the specification enables the claim development of a reservoir.

Claims 27-42 stand rejected on grounds of indefiniteness. The claims have been amended to overcome the stated grounds of rejection. With respect to the Amendment of step c) of claim 27, the Examiner is referred to paragraph [0028] in the Substitute Specification for support for the amendments therein.

Claims 27-28, 31-32, 35-36 and 39-40 stand rejected under 35 U.S.C. §102 as being anticipated by U.S. Published Application 2002/0029882 (Rouffignac et al). These grounds of rejection are traversed for the following reasons.

The Examiner contends that step c) of claim 27 is anticipated by paragraphs 112, 521, 739, 874 and 961 of Rouffignac et al. It is submitted that while some of these paragraphs do, in fact, refer to simulation flow, none of the paragraphs anticipate either subparagraph c) prior to amendment or as amended and paragraph d).

It is submitted that Rouffignac et al in none of the referenced paragraphs discloses "a simulation of fluid flows, to estimate corrections to the applied to said permeabilities in order to reduce a difference between said simulated production data or simulated pressure data obtained from well tests and said simulated production or pressure data." For example, the reference to simulation of $H_2$ in paragraph [0961] has nothing to do with the foregoing subject matter.

Moreover, since the result of subparagraph c) of claim 27 is to estimate corrections, the claimed propagating of corrections in step d) is also not taught by Rouffignac et al.

The present invention is a departure from the traditional approach of calibration of reservoir models which is an iterative process as described in paragraph [0027] of the Substitute Specification.

Dependent claims 28, 31-32, 35-36 and 39-40 are patentable for the same reasons as set forth above with respect to claim 27.

Claims 27-28, 31-32, 35-36 and 39-40 stand rejected under 35 U.S.C. §103 as being unpatentable over United States Patent 6,826,520 (Kahn) in view of Rouffignac et al. The Examiner concludes that Kahn teaches step c) in column 5, lines 51-61, and column 12, lines 42-59, and further teaches step d) in column 11, lines 6-12. This ground of rejection is traversed for the following reasons.

Column 5, lines 51-61, and column 12, lines 42-55, disclose a flow based method for upscaling permeabilities associated with a fine-scale geologic grid system. This subject matter has nothing to do with the subject matter of step c) to estimate corrections to be applied to said permeabilities in order to reduce a difference between said simulated production data or simulated pressure data

obtained from well tests and said simulated production or pressure data. Moreover, column 11, lines 6-12, pertains to the expression of equation 5 using a known relationship which does not pertain to propagating said corrections of step d) as calculated in step c).

Accordingly, if the proposed combination were made, the subject matter of claim 27 would not be achieved since Kahn is deficient in teaching this subject matter and further, Rouffignac et al, as discussed above, is also deficient in disclosing this subject matter. Accordingly, the rejection of the claims as being obvious is erroneous.

In view of the foregoing amendments and remarks, it is submitted that each of the claims in the application is in condition for allowance. Accordingly, early allowance thereof is respectfully requested.

To the extent necessary, Applicants petition for an extension of time under 37 C.F.R. §1.136. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 01-2135 (612.42904X00) and please credit any excess fees to such Deposit Account.

Respectfully submitted,

ANTONELLI, TERRY, STOUT & KRAUS, LLP

/Donald E. Stout/ /ES

Donald E. Stout
Registration No. 26,422
(703) 312-6600

DES:dlh